

EDITORIAL COMMENT

Appropriate Use Criteria

Vital New Link in the Chain of Quality in Pediatric Echocardiography*



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Appropriate use criteria (AUC) have been increasingly recognized and utilized as an important link in the chain of quality for adult cardiovascular care since first proposed in 2005 (1) (Figure 1).

Motivations for the development of adult AUC included better provider stewardship of resources, given a noted dramatic rise in Medicare expenditure for imaging tests in excess of other services (2). The need for improved consistency in care was highlighted by payment data indicating regional overuse of imaging studies (3,4). It was hoped that AUC in combination with a demonstration of a pattern of adherence would provide insurance companies with a schema of reasonable utilization of echocardiography, thus decreasing the need for burdensome and lengthy insurance preauthorization processes (5,6).

The first AUC for adult transthoracic echocardiography (TTE) was published in 2007. Studies evaluating the applicability of the AUC showed that most TTE (87% to 89% of classifiable studies) were ordered for appropriate (A) indications (7-10). However, numerous studies were unclassifiable, given a lack of matching AUC indications (11). Revisions were then incorporated into the 2011 AUC and allowed a marked reduction in the proportion of unclassifiable studies (12,13).

While pediatric cardiology services consume a much smaller portion of national health care dollars as compared to adult cardiology, there is still a need

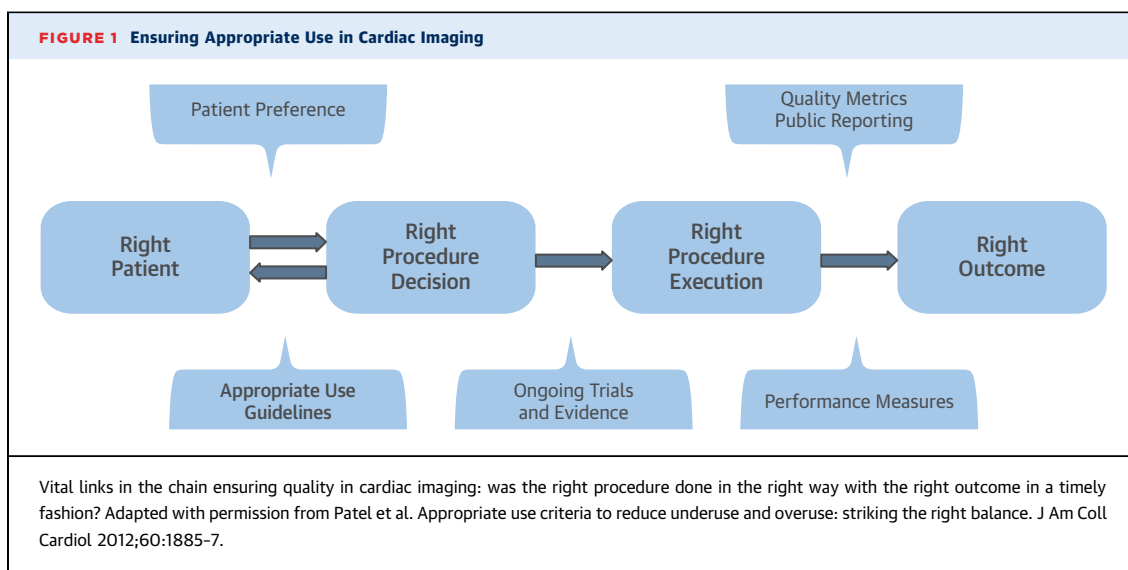
to self-regulate our practice to improve quality and optimize resource utilization. The Institute of Medicine mandates that high-quality care be safe, timely, equitable, efficient, effective, and patient centered and that re-engineering care processes is an essential component of quality initiatives (14). To reduce overutilization of undervalued testing, the American Board of Internal Medicine launched the Choosing Wisely Campaign in 2012 (15). The publication of the 2014 *Appropriate Use Criteria for Initial Transthoracic Echocardiography in Outpatient Pediatric Cardiology* marked the first step in forging the AUC link to the chain of quality care for pediatric echocardiography (16). An appropriate imaging study was defined as one in which the expected incremental information, combined with clinical judgment, exceeds the expected negative consequences (of the procedure or downstream consequences such as delay in diagnosis or false positive diagnosis) by a sufficiently wide margin for a specific indication that the procedure is generally considered acceptable care and a reasonable approach for that indication (16).

SEE PAGE 1132

In this issue of the *Journal*, the first project examining the clinical applicability of these first pediatric AUC for outpatient TTE is reported (17). The ACC AUC Task Force supported this project, and the lead author of this work was also the lead author for the pediatric AUC document. The investigators focused on TTE ordered by pediatric cardiologists in outpatient settings prior to the release of the pediatric AUC criteria so that baseline ordering appropriateness could be ascertained for future comparisons. The study prospectively evaluated 2,655 studies ordered over 6 months by 102 pediatric cardiologists at 6 academic centers. TTE orders by noncardiology providers were necessarily excluded, as the researchers

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were unable to consistently accurately determine their indications.

While publication of the pediatric TTE AUC was initially greeted by some in the pediatric cardiology community with trepidation and anxiety, the results from this project are largely reassuring. At baseline, 83% of echocardiograms ordered by pediatric cardiologists were for indications considered A or may be appropriate (M), with only 12% deemed as rarely appropriate. Significantly, this study did reveal several important criteria which should be added as A in future AUC. These include examination findings of clicks or gallops, and historical elements, such as syncope <5 years of age or acute life-threatening events in infants.

Based on this study, the pediatric AUC reasonably stratified most clinical indications. The odds of an abnormal finding on TTE were 6.4 times higher for echocardiograms ordered for indication rated A or M, compared to R. Presumptive pathologic murmurs had the highest rate of positive TTE at 40% while presumptive innocent murmurs had only 8%.

However, what about the 85% ($n = 2,251$) of TTE which resulted in no identifiable pathology? Does this suggest there are opportunities to limit the routine use of pediatric TTE without negatively affecting care? There are certainly circumstances where this is likely true (such as isolated palpitations or syncope with benign family history, normal electrocardiogram). However, the significant value in a negative study should not be underestimated. For example, exertional chest pain, 1 of the top 3 A-rated reasons to order an echocardiogram, yielded only 0.6% positive studies. Being able to reassure those children and their families, to encourage unlimited physical exercise, and to

permit unrestricted sports participation is very likely to improve short- and long-term health. This is an important positive clinical impact of a negative study, in view of the negative consequences of decreased physical activity and the alarming obesity rates in children.

The pediatric AUC outpatient TTE document and this project are important first steps in advancing the utility and utilization of AUC in the primary cardiovascular imaging modality for the pediatric age group. However, much important work remains to be done, including the following:

1. Perhaps first and foremost, continuing to reassure the pediatric cardiology community that AUC are important links in the chain of quality care for our patients by providing guidance for when it is reasonable to order a test, but not chains binding us from using our sound clinical judgment for an individual patient. AUC should supplement and support our clinical judgment, not supersede it.
2. To improve and broaden applicability of future iterations of the pediatric AUC, assess:
 - a. Other academic and nonacademic pediatric cardiology practices, including physician and nonphysician providers.
 - b. TTE ordered by pediatricians, family practitioners, and other nonpediatric cardiologist providers.
 - c. The thorny issue of sports clearance echocardiograms.
3. Incorporate the results of these various post-AUC assessment projects and evolving evidence based practice guidelines into future AUC documents.
4. Consider cost and efficiency decision analyses for various indications, such as murmurs. Philosophically and practically, if echocardiograms are increasing

routinely being employed at point of care settings in pediatric emergency rooms and intensive care units to evaluate ventricular function, filling, and effusions, what about evaluation of murmurs in the outpatient setting? Is echocardiography now being considered by younger health care providers as a better tool than the stethoscope to complete the physical examination because of a lack of confidence in auscultation skills? Does a provider order an echocardiogram for a “presumptive” innocent murmur if the patient is a neonate or for a lack of response to change in position or unusual radiation? Was it to reassure a family or a referring primary care provider? Importantly, AUC may strengthen the ability of a pediatric cardiologist to successfully reassure a family or referring primary care provider without an otherwise obligatory expected TTE.

5. Develop educational programs and tools to improve knowledge of AUC and impact ordering of inappropriate testing.
6. Develop electronic tools to track appropriateness of TTE orders by echo lab and provider. While the decision to order an echo rests with the provider, the echo lab stands to gain or lose more, including accreditation, reimbursement, and reputation.
7. Assess preauthorization practices and reimbursement over time for pediatric outpatient TTE. In

adult medicine, starting in January 2017, ordering providers will be required to consult with AUC as a clinical decision support for all Medicare patients receiving advanced cardiac imaging (18). Importantly, reimbursement for an individual patient will not be tied to appropriateness score.

8. Finally, and most importantly, evaluate the true impact of AUC on patient care and outcomes. This has been a struggle in the adult echo world and consistent efficacy remains to be seen. In a 2015 meta-analysis of 59 studies published between 2002 and 2012, Fonseca et al. (4) reported that appropriateness improved over time from 80% to 85%. However, it could be argued this was due to the addition of classifiable criteria in the 2011 AUC, as there was no improvement in the proportion of A studies for classifiable indications.

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